Laser Therapy

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Introduction:-

The word LASER is an acronym for Light Amplification of Stimulated Emission of Radiation. It refers to the production of a beam of a radiation which differs from the ordinary light in several ways.

Properties of laser:-

1. Monochromaticity:- This means that the laser light has a single color (mono-single, chromaticity—coloration). This is because the lasers are of a single wavelength and thus the definite frequency.

2.Coherence: Laser radiations are not of the same

wavelength but also has same phase. Coherence means similar or synchronous behavior of laser beam.

3.Collimation: Laser beams remain collimated that means they remain in parallel. They do not diverge much.

Production of Laser

The electrons of an individual atom remain as a ‘cloud’of negative charge around the positive nucleus. According to the quantum theory, the electrons can only occupy certain energy levels or shells around the nucleus. Under normal circumstances, in the vast majority of the atoms the electrons remain at the lowest energy level, i.e. at the resting or ground state.

If enough energy is added to atom, an outer electron may gain sufficient energy to free itself from the nucleus.

* The atom then becomes a positively charged ion and the electron becomes a free negative charge. When the outer electrons are in one of the higher energy states, they will tend to return to a lower energy state, sometimes to the most stable or ground state.

* Also, the quantum energy which is expressed in electron volts is inversely proportional to the wavelength. This means the greater the quantum energy; the lesser will be the wavelength.

* A large number of atoms with the electrons in the excited state can lead to amplification since one photon releases a second and these two can release more and so on.

Components for laser production

For the production of a laser radiation, the device must consist of the following components:

1. Lasing medium
2. Resonating chamber
3. Energy source.

1. **Lasing medium**: The material which is capable of producing laser is known as lasing medium. It can absorb energy from the external source and then gives off its excess energy as photons of light. Lasing medium could be solid crystal or semiconductor, liquid or gas. The lasing media in low intensity laser or cold laser are either helium-neon (He-Ne) or semiconductor, i.e. gallium-arsenide (Ga-As).

2. **Resonating chamber**: The resonating chamber contains the lasing medium which is surrounded by two parallel mirrors at either ends. One of the mirrors has 100% reflectance while the other has slightly less reflectance. The mirror with slightly less reflectance

serves as an output device which allows some of the photons to escape through it.

3. **Energy source**: A flashgun is used to excite the electrons of the lasing medium. The source of flashgun is usually current electricity.

Types of Laser

The various types of laser are available nowadays. The commonly used lasers are:

1. Ruby laser (or crystal laser)
2. Helium-neon laser (gas laser)
3. Diode laser (or semiconductor laser).

Ruby Laser (Crystal Laser)

Ruby laser is also known as crystal laser because it contains synthetic ruby as a lasing medium. Synthetic medium (aluminium oxide and chromium) are used rather than the natural one to ensure purity of the medium which is necessary to generate physical characteristics of laser.

Helium-neon Laser (Gas Laser)

Gas laser consists of a mixture of primarily helium and neon in a low pressure tube.

Diode Laser (Semiconductor Laser)

Gsallium and arsenide are used as a diode or semiconductor to produce an LASER.

Techniques of Application

The method of application of laser therapy is quite simple. Generally, the laser energy is emitted by a hand held applicator for therapeutic purposes.

To administer the laser for therapeutic purposes, two methods are generally used:

1. Grid method
2. Scanning method.

The grid method

The treatment area is divided into a grid each of 1 square cm. The hand held applicator should be in light contact with the skin and directly perpendicular to the target tissue. Each square cm is stimulated for a specific period of time.

The scanning method

No contact is made between the tip of the laser and the patient’s skin. The tip of the applicator is held at a distance of 5 to 10 mm.

Physiological Effects

* Healing :-Laser therapy increases tissue proliferation and thus enhances wound healing.

* Tensile strength :-Improved significantly by the laser

* Bactericidal effects :-Laser therapy has bactericidal effects because of increased phagocytosis by leukocytes.

* Bone and articular cartilage:- Studies on the effects of laser on bones and articular cartilage is increasing day-by-day. It has been found that the longer duration of low power laser helps in fracture healing and bone remodulation.

Indications:-

* Wound healing:-Laser therapy is nowadays being effectively used for the treatment of wounds.Laser therapy increases tissue proliferation and thus enhances wound healing caused due to burns, surgical incisions, diabetic ulcers and pressure sores.

* Tensile strength of scar tissue: The tensile strength of the tissues treated with laser

* Musculoskeletal conditions: The laser therapy is found to be very effective in various overuse tendinitis or bursitis conditions like tennis elbow, golfers elbow, supraspinatus tendinitis, etc.

Various arthritic conditions like rheumatoid arthritis, osteoarthritis, ankylosing arthritis, pyogenic arthritis, etc. are benefited by the use of laser therapy.

* Pain relief:- Laser therapy is found effective in relieving pain, both acute as well as chronic.

* Fracture healing:-. It has been found that the longer duration of low power laser helps in fracture healing and bone remodulation.

Contraindications

* Over the eyes

* Over the cancerous growth

* Over the pregnant uterus

* Hemorrhagic areas

* Cardiac conditions

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